THE WEATHER IN SEPTEMBER.

THE weather-review of the U. S. signal-service shows that in September there were two peculiar features, — the low mean temperature, and the deficiency in rainfall. The former was characteristic of all districts east of the Rocky Mountains, though the temperature was above the normal on the Pacific coast. The greatest deficiency in rainfall was in the east Gulf states, but the drought has been severe in various sections. Forest-fires burned over large tracts of land, causing the destruction of much property, especially in New England.

The accompanying chart exhibits the mean pressure, temperature, and wind-directions for the month, and needs no special comment. Nine barometric depressions were observed within the limits of the country, the average course being farther north than is usual. Of these, one was especially severe on the Lakes and in Canada, and one was a well-developed tropical hurricane. The latter was first observed near Martinique, on the 4th: it was very violent in the Caribbean Sea, and caused great destruction in the Bahamas, the loss of life being over fifty. It reached the North Carolina coast on the 11th, and was a destructive gale between Cape Hatteras and Wilmington, but lost its energy on reaching the land, and was wholly dissipated. While the damage from the hurricane was great, good service to commerce was rendered by the frequent warnings issued by the signal-service. The depression which existed on the 21st is worthy of note on account of its unusual track. It moved from Milwaukee, north-west to St. Paul, thence southward over Iowa and Missouri, and was the means of considerably modifying the effect of a cold wave which threatened extensive damage by frost. Five storm-centres are traced on the Atlantic, one of which is a continuation of the second of the August hurricanes described in SCIENCE, No. 37, and which passed over Great Britain. Four vessels only report passing icebergs.

With the approach of fall, frequent frosts are reported, and a frost-chart is a special feature of the review: it gives the limits of the regions in which frosts were experienced in connection with the three leading cold waves of the month. In contrast with this, maximum temperatures of 100° or higher were noted in Arizona, California, Idaho, Kansas, Louisiana, Nevada, Texas, and Utah; the highest being 122°.

The extent of the deficiency in the rainfall is indicated by the following precipitation table: —

Average precipitation for September, 1883.

Districts.	Average for September. Signal-service observations.		Comparison of September, 1883, with the average for several years.
	For several years.	For 1883.	
	Inches.	Inches.	Inches.
New England	3.74	2.50	1.24 deficiency.
Middle Atlantic states	4.14	4.47	0.33 excess.
South Atlantic states	5.94	6.63	0.69 excess.
Florida peninsula	6.76	5.07	1.69 deficiency.
Eastern gulf	4.98	1.05	3.93 deficiency.
Western gulf	4.33	3.17	1.16 deficiency.
Rio Grande valley	4.54	6.31	1.77 excess.
Tennessee	3.48	2.29	1.19 deficiency.
Ohio valley	2.49	1.53	0.96 deficiency.
Lower lakes	3.03	2.82	0.21 deficiency.
Upper lakes	3.98	2.78	1.20 deficiency.
Extreme north-west	2.24	1.01	1.23 deficiency.
Upper Mississippi valley,	3.45	1.67	1.78 deficiency.
Missouri valley	2.60	2.60	Normal.
Northern slope	1.26	0.89	0.37 deficiency.
Middle slope	1.59	3.02	1.43 excess.
Northern plateau	0.78	0.06	0.72 deficiency.
Southern plateau	1.22	0.57	0.65 deficiency.
North Pacific coast	2.13	1.18	0.95 deficiency.
Middle Pacific coast	0.21	0.48	0.27 excess.
South Pacific coast	0.03	0.04	0.01 excess.

The drought in the southern states is a continuation of that of former months, as is shown by the following table of deficiencies in the districts named: —

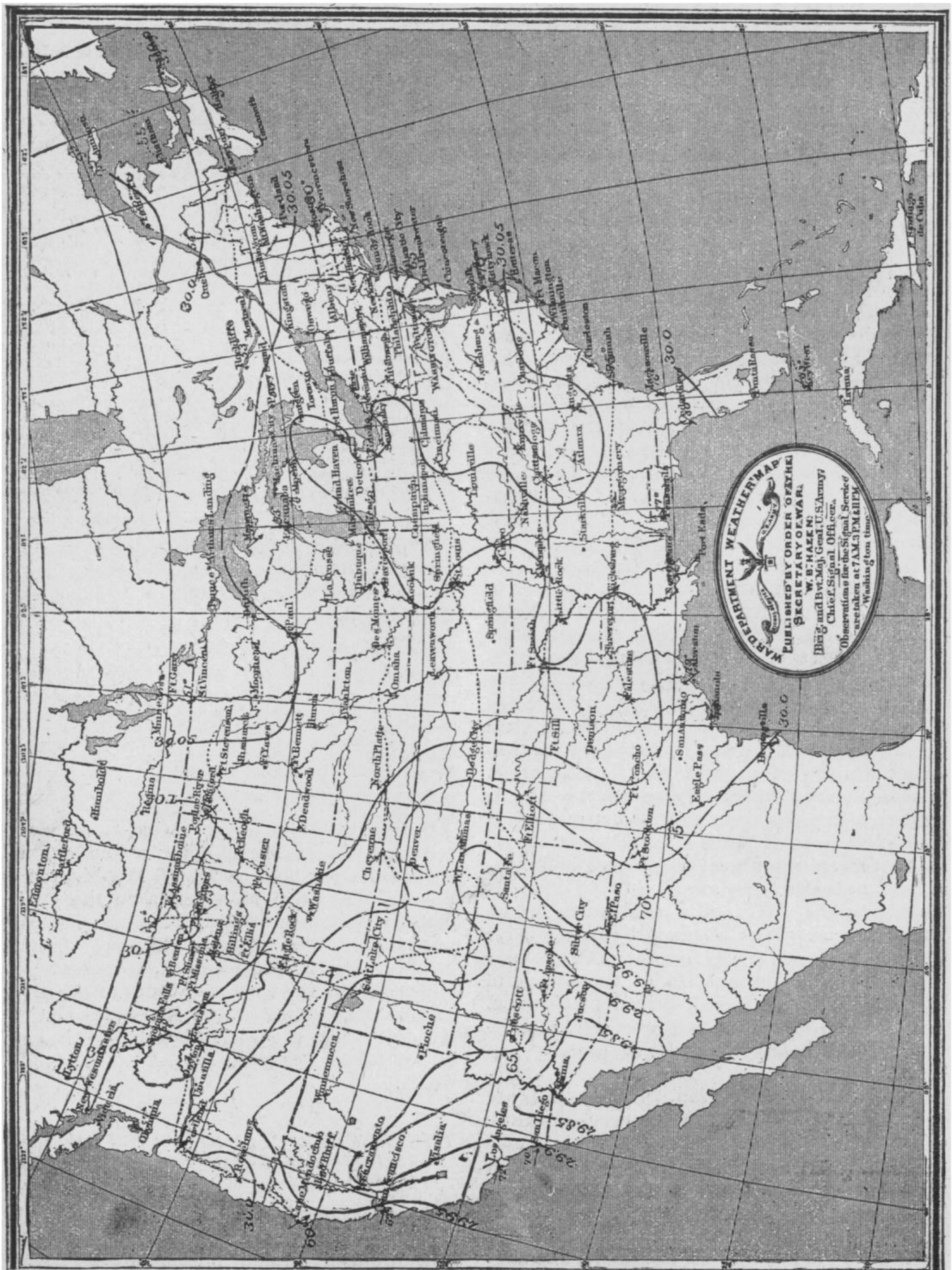
Districts.	July.	August.	September.	Total.
	Inches.	Inches.	Inches.	Inches.
Tennessee	−0.99	−0.41	−1.19	−2.59
South Atlantic	−0.73	−0.72	+0.69	−0.76
Eastern gulf	−2.54	−1.94	−3.93	−8.41
Western gulf	−1.72	−2.65	−1.16	−5.53

Several instances of great wind-velocity were recorded, the maximum being a hundred and eight miles per hour at Mount Washington on the 9th. At Cape Mendocino, on the Pacific coast, a maximum velocity of ninety-six miles was noted. The singular fact, not unusual, however, in the winter season, is deserving of mention, that the total movement of the air at Delaware Breakwater and Kittyhawk, on the Atlantic coast, is greater than that at the summit of Pike's Peak, the loftiest station in the world.

THE ELECTRIC LIGHT ON THE U. S. FISH-COMMISSION STEAMER ALBATROSS.[1] — II.

As superintendent of the building of the ship, my expectation was, that numerous and intricate problems would present themselves in running the wires about the iron hull, through

[1] Continued from No. 41.



MONTHLY MEAN ISOBARS, ISOTHERMS, AND WIND-DIRECTIONS, SEPTEMBER, 1883. REPRINTED IN REDUCED FORM BY PERMISSION OF THE CHIEF SIGNAL-OFFICER.

iron bulkheads and beams, close to the boilers or hot steam-pipes, and through damp places.

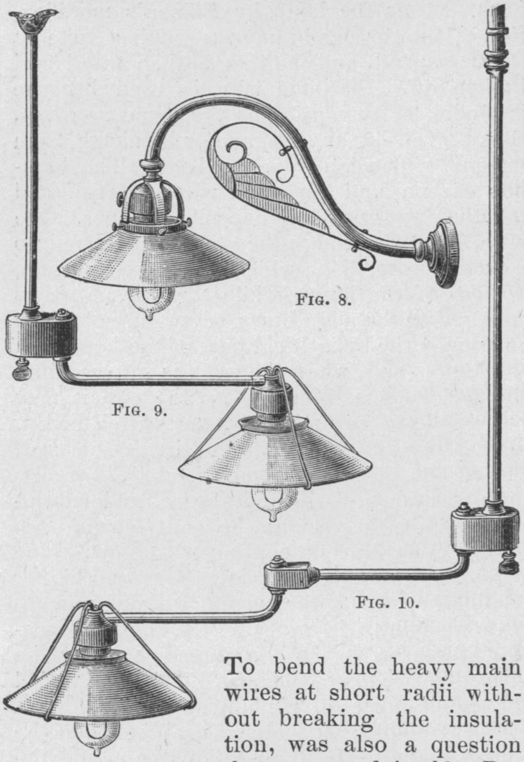


FIG. 8.

FIG. 9.

FIG. 10.

To bend the heavy main wires at short radii without breaking the insulation, was also a question that presented itself. But all these had been apprehended. Where the wires passed damp places, they were incased in rubber tubes, besides their insulation of cotton-cloth and white lead; in all hot places they were incased in lead pipe; where they passed through iron bulk-heads or beams, ferrules of hard rubber or gutta-percha were used; and the mains, instead of being single wires of large size, were composed of a number of smaller wires, which, of course, made them more flexible. Where the wires passed an iron surface, such as a lodger-plate or stringer, they were fitted to a groove in a wooden batten; and, where they passed a wooden surface, they were embedded into a groove cut in the wood; and, when carefully painted over, it is difficult to detect their presence. The main wires, as far as possible, were led behind the wooden lining of the ship. Where the wires were spliced or 'tapped,' their insulation was removed, and the naked metallic surfaces brightened with sand-paper, to insure metallic contact. They were then twisted together tightly, and soldered. The naked place was then covered with insulation-tape, which is common cotton tape saturated with a bituminous insulation compound manufactured by the Edison company, the components of which are kept a profound secret, and which an irreverent young man has named 'gulloot.'

The lamp-fixtures are designed to suspend the shade above, and to cast the unobstructed rays of the light downward. Handsome brass fixtures of three kinds, with porcelain shades, are used on board. Fig. 8 is called a bracket, and figs. 9 and 10 are single and double swing-brackets respectively.

The wires are run through the tubes of these brackets; but in the joints of the swing-brackets the current is transmitted through insulated hinges, to which the wires are fixed by binding-screws, as shown at *a* in fig. 11, by which arrangement the wires are not twisted in swinging the bracket.

The wires are brought to the binding-posts in the lamp-socket, fig. 12, between their binding-posts and brass conductors. One of these brass conductors is soldered to the thin spun brass socket into which the lamp is screwed, while the other is connected, through the key, to a brass disk, placed centrally in the bottom of the socket, against which one pole of the lamp presses when screwed in place. The key is mounted on a screw-thread of such pitch that one-fourth of a convolution will give it sufficient axial motion to open and close

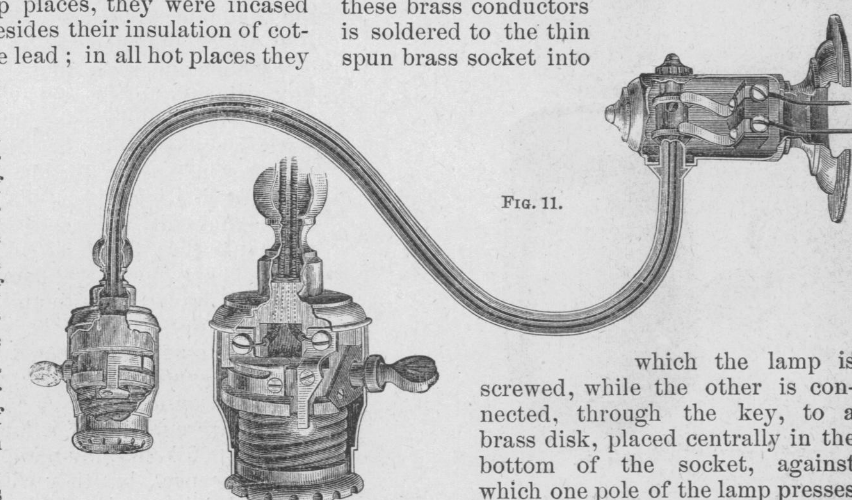


FIG. 11.

FIG. 12.

the circuit. The small number of parts used in these fixtures, their correct proportions, the adaptation of their forms to machine-tool manufacture, and their beauty of design, excite the admiration of the mechanic and the artist.

Fig. 13.

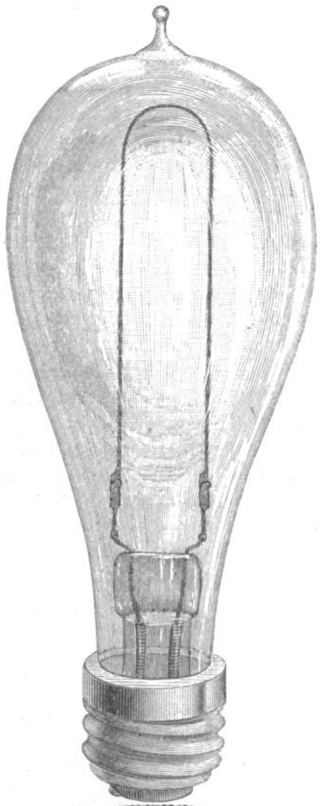


Fig. 14.

The lamps are of thin glass, pear-shaped, containing a thread of bamboo carbon about the thickness of a horse-hair. The small end of the lamp contains glass of sufficient thickness (fig. 13) to make a tight joint on the platinum-wire conductors which carry the current to the carbon. The atmosphere is exhausted from the lamp by Edison's modification of the Sprengel pump, through a tube at the upper end, and the tube is then fused and broken off. Platinum wire is used because its index of expansion is the same as glass, thus preventing any leakage or breakage from unequal expansion from the heat. The bamboo carbon and platinum wire are soldered together by electrically deposited copper. One wire, passing through the glass, is soldered to a small brass disk, which is centred on the bottom of the lamp, while the other wire is soldered to the spun brass screw-thread which surrounds the cylindrical part of the bottom of the lamp; and, when the lamp is screwed into the socket (figs. 14 and 12), the circuit may be completed or broken by the switch or key already described. When the circuit is closed, the carbon thread becomes heated, from its high resistance, to incandescence, and continues to glow, in vacuum, without burning, so long as the current continues to flow. The wires having a larger sectional area and higher conductivity carry the current without perceptibly warming. By varying the length or sectional area of the carbon thread, keeping the electromotive force constant, Edison has varied the candle-power of his lamps.

For example: let the electrical resistance be represented by R, the sectional area of the wire or carbon by S, the length by L, and the constant, dependent on the material of which the conductor is made, by a; then $S\,R = a\,L$, from which simple equation the relative sizes of carbons and wires may be determined, and proportioned to the tension in the circuit. Mr. Edison employs a number of different-sized dynamos, which he designates by letters; but he winds them for but two tensions, i.e., the *A* and *B* circuits. The *A* lamp belongs to the *A* circuit, as its carbon thread is of such resistance that the *B* circuit would heat it to only a cherry red. A *B* lamp, however, in the *A* circuit, would acquire an intense brightness, but its duration would be very limited. Two *B* lamps in series, in the *A* circuit, would, by their augmented resistance, glow at about their normal incandescence.

The average life of a lamp is said to be about 1,000 hours, when kept up to its normal incandescence; but they will last much longer if their brightness is a little suppressed. This may be effected either by throwing in resistance, or by slowing the engine. On board ship, however, about as many lamps are broken by accident as from natural deterioration.

The cost of the lamps is one dollar each; and, at the present rate of consumption from all causes, the annual expenditure will be 56 lamps. The dynamo is run about 2,190 hours per year (about six hours per day), with an average of about $47\frac{1}{2}$ lamps in circuit, so that the annual lamp-hours would be about 104,025 (2190×47.5). Thus it appears that our lamps will, at present consumption, last us in the neighborhood of 1,857 ($\frac{104025}{56}$) hours each.

Description of lamps.

Designation of lamps.	Candle-power.	Resistance in ohms.	Current in ampères.	Electromotive force in volts.
A	32	86	1.180	102
A	16	137	0.745	102
A	10	250	0.400	102
B	8	69	0.745	51
B	16	42	1.200	51

In event of a short circuit through a good conductor, between the wires there would be instantly generated heat of such intensity that the wires would melt, and perhaps the armature also. This heat would in all probability set fire to the wood-work along the line of the wire. To prevent this, Edison has devised his cut-out block, or safety-catch, — a neat device for placing a short piece of alloy in the circuit, which, at 400° F., will melt, and open the cir-

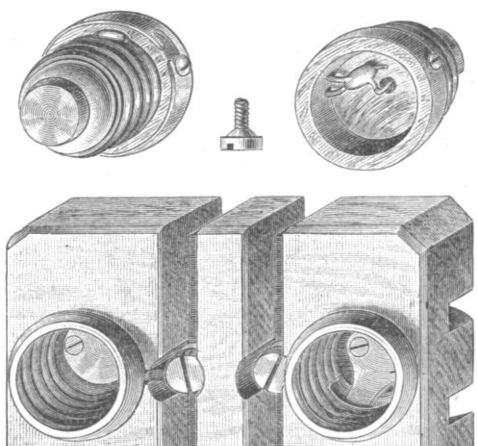


FIG. 15.

cuit. When this happens, all the lamps on the branch circuit fed through that cut-out will be immediately extinguished; and, though one is left in darkness at that point, he is rewarded by a consciousness of greater mischief having been prevented. Fig. 15 represents a double pole cut-out block, a front and back view of the cut-out plug, and a binding-screw. Fig. 16 shows a back view of the same cut-out block, and a section through a cut-out plug. The fusible alloy is contained in the plug, and

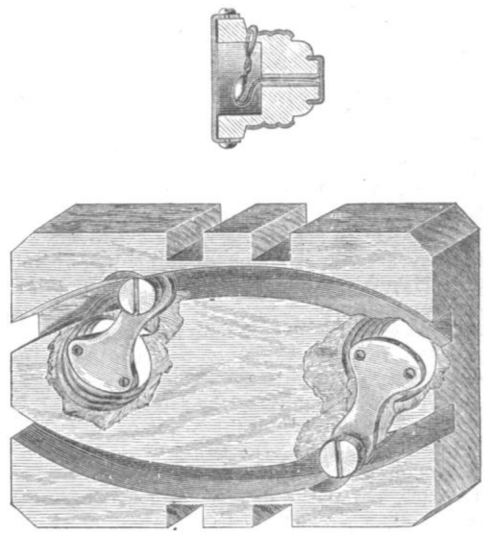


FIG. 16.

is utilized as a solder to unite the two poles of the plug. The plug is made similar to the bottom of a lamp, and the block-socket is similar to a lamp-socket. The wires are held by the binding-screws, and the current passes through the metal of the block and plug. These cut-outs are placed on each of the main circuits, near the dynamo, and on each branch circuit, and always in convenient positions. The alloy in the plug is the only part destroyed by a short circuit, and it is only a minute's work to substitute a new plug.

(*To be continued.*)

REPORT OF THE GERMAN CHOLERA COMMISSION.[1]

WHEN the commission arrived in Egypt, the cholera epidemic had already begun to decline, so that we could not expect to obtain all the material necessary for carrying out our examinations. Besides, since the termination of an epidemic is the least suitable time for etiological researches, our original plan was to make such preliminary studies as we could in Egypt, and then check our results, as soon as the epidemic had reached Syria, by further investiga-

[1] Report to Minister von Bötticher, secretary of state for the interior. By Dr. KOCH. From the *Kölnische zeitung* of Oct. 15.